

DOCUMENT NUMBER 5156

NO FURTHER ACTION DETERMINATION

CFA-33 CFA FUEL OIL TANK AT CFA 667 (SOUTH SIDE)
OPERABLE UNIT 4-03

WAG 4

**DECISION DOCUMENTATION PACKAGE
COVER SHEET****PREPARED IN ACCORDANCE WITH****TRACK 1 SITES:
GUIDANCE FOR ASSESSING
LOW PROBABILITY SITES
AT INEL****SITE DESCRIPTION:** Underground Storage Tank CFA-667S**SITE ID:** CFA-33**OPERABLE UNIT:** 04-03**WASTE AREA GROUP:** 04**I. SUMMARY - PHYSICAL DESCRIPTION OF THE SITE:**

CFA-33 is the historical site of a 4,000 gal underground storage tank designated as CFA-667S. The tank was installed in 1951 within 5 ft at the southwest corner of building CFA-667. The tank was used to store fuel oil used for heating the building. The tank was abandoned in 1986. In May 1989, the remaining contents of the tank were sampled for waste profile analysis and determined to be fuel oil #2. The remaining 20 gal of fuel were collected in October 1990 by EG&G Idaho Hazardous Waste for recycling. Less than 0.5 in. were left in the bottom of the tank.

The tank was removed in October 1990 under the direction of the EG&G Idaho Tank Management Program. Volatile organic compounds (VOCs) were monitored during removal per program guidelines. All readings were well below the EG&G Idaho field action level for diesel of 50 ppm. Some soil contamination was observed around the fill port during removal and was removed, collected, and transported to the Central Facilities Area landfill for landfarming. Upon removal of the tank, areas for soil sampling were selected based on where contamination was most likely to occur. The field VOC readings for these five soil samples were well below the EG&G action level for diesel. Based on these readings, the excavation was determined acceptable for backfilling and was done with original noncontaminated soil and with soil from the gravel pit at the INEL CFA. Laboratory analyses of the soil samples confirmed field readings. Analyses for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylene were performed by DataChem Laboratories of Salt Lake City, UT with no contamination detected in any of the samples.

DECISION RECOMMENDATION

II. SUMMARY - QUALITATIVE ASSESSMENT OF RISK:

The information gathered has been determined reliable and the qualitative risk assessment concluded low. Tank removal and sample analyses were conducted following published procedures and no conflict information was found in any records documenting the processes. Using the Qualitative Risk and Reliability Evaluation Table, it is concluded that no further action is required for CFA-33.

III. SUMMARY - CONSEQUENCES OF ERROR:

If the decision is made in error to close CFA-33, the possibility exists for contaminant migration to groundwater. The contaminants include benzene, toluene, ethylbenzene, xylene, and petroleum hydrocarbons in the form of #2 diesel fuel. If, in actuality, the tank did leak its capacity of 4,000 gal to the surrounding soil, an estimated 350 yd³ of soil would be contaminated.

If the decision is made in error to further remediate CFA-33 and the site poses no actual environmental threat, realized benefits would be minimal relative to the high investment in remediation expenditures.

IV. SUMMARY - OTHER DECISION DRIVERS

None.

RECOMMENDED ACTION:

It is recommended that COCA Site CFA-33 be reclassified as to "no-action" status and removed from the list of INEL solid waste management units. The information gathered is deemed reliable and the assessed risk is very low. The tank was removed following established procedures and biased soil samples were collected for analysis of TPH and BTEX. No contamination was detected in any of the soil samples. These results suggest that no contamination is present at the site and that it poses no environmental threat. Further remediation of this COCA site would require funding which could be utilized more efficiently in other areas.

SIGNATURES

PAGES:

DATE: 12/10/91

Prepared By: *J. Benson*

DOE WAG Manager:

Approved By:

Independent Review: *William Winters*

NO FURTHER ACTION DETERMINATION

The U.S. Department of Energy, the U.S. Environmental Protection Agency-Region 10, and the State of Idaho have completed a review of the referenced information for CFA-33 hazardous waste site, as it pertains to the INEL Federal Facility Agreement of 12/4/91. Based on this review, the Parties have determined that no further action for purposes of investigation or study is justified. This decision is subject to review at the time of issuance of the Record of Decision. Brief summary of the basis for no further action:

References:

DOE Project Manager



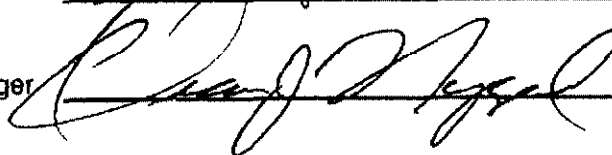
1/16/92
Date

EPA Project Manager



1/16/92
Date

Idaho Project Manager



1/16/92
Date

DECISION STATEMENT
(BY DOE RPM)

DATE RECD:

1/16/92

DISPOSITION:

CFA 33

- Head remaining indicating tank integrity
- only sign of remaining discharge
- Soil removed
- Tank contents removed
- Tank removed
- Samples show no risk

DATE:

1/16/92

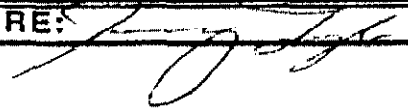
PAGES (DECISION
STATEMENT)

1

NAME:

JOHN L. LEE

SIGNATURE:



**DECISION STATEMENT
(BY EPA RPM)**

DATE RECD:

DISPOSITION:

DATE:

**# PAGES (DECISION
STATEMENT)**

NAME:

SIGNATURE:

DECISION STATEMENT
(BY STATE RPM)

CEA - 33

DATE RECD:

1/16/92

DISPOSITION:

The state's determination after review of the supporting documentation referenced herein is that no further action is required. This determination will be renewed at the time of the proposed plan for CEA WAG - which investigation for public comment. The resulting decision will be incorporated into the plan.

We note the following observations to support this determination:

- ^{sergeant} field observations for organics, was confirmed through field sampling and lab analysis, with no detection of BTEX.
- Materials found in the tank is not a hazardous waste.
- source does not pose a risk based on calculations performed consistent with the DAO guidance document agreed to by the state.

DATE:

1/16/92

PAGES (DECISION STATEMENT)

NAME:

Dean J. Nygaard

SIGNATURE:

[Signature]

PROCESS/WASTE WORKSHEET

SITE ID CFA-33

col 1 Processes Associated with this site	col 2 Waste Description & Handling Procedures	col 3 Description & Location of any Artifact/Structures/Disposal Areas Associated with this Waste or Process
Process Diesel fuel oil #2 storage in an underground storage tank (UST) CFA-667S	20 gal. of diesel fuel oil #2 recovered by EG&G Idaho, Inc. Hazardous Waste Program	Artifact Location Description
		Artifact Location Description
		Artifact Location Description
Process Removal of UST CFA-667S	Diesel fuel oil #2 contaminated soil	Artifact Underground storage tank Location Now removed, previously located within 5 ft southwest of CFA-667 Description 4,000 gal. steel tank
		Artifact Associated piping Location Now removed, previously located with tank southwest of CFA-667 Description Tar-coated steel piping
		Artifact Location Description
Process		Artifact Location Description
		Artifact Location Description
		Artifact Location Description

DECISION STATEMENT
(BY STATE RPM)

EPH

DATE RECD:

1/16/92

DISPOSITION:

CFA 33 UST 667 S

Summary Assessment, residual soil sampling
1.5" heel in Tank support no further
action. Question concerning reference #9
about small amt of leaking fuel but removal
should have addressed quantity sufficient
to not be alarmed at future release potential.
No CL-HC no BTEX. Dirty fuel oil.

GPR reference not GPR results but interpret
of GPR data. Peristaltic pump of tank contents
& holding time may have caused volatilization
Ref #8 should be 18th for date.

Recommend No further action

DATE:

1/16/92

PAGES (DECISION
STATEMENT)

NAME: Wayne Pierce

SIGNATURE:

Wayne Pierce

PROCESS/WASTE WORKSHEET**SITE ID CFA-33**

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		Artifact Location Description
Process		Artifact Location Description
		Artifact Location Description
		Artifact Location Description

CONTAMINANT WORKSHEET

SITE ID CFA-33

PROCESS (col 1) UST Removal

WASTE

Soil

Col 4 What known/potential hazardous substances/constituents are associated with this waste or process?	Col 5 Potential sources associated with this hazardous material?	Col 6 Known/estimated concentrations of hazardous substances/constituents ^a	Col 7 Risk based concentration mg/kg	Col 8 Qualitative risk assessment (Hi/Med/Lo)	Col 9 Overall reliability (Hi/Med/Lo)
Benzene	Contaminated Soil	ND, DL = 0.05	---	Low	High
Toluene	Contaminated Soil	ND, DL = 0.05	---	Low	High
Ethylbenzene	Contaminated Soil	ND, DL = 0.05	---	Low	High
Xylene	Contaminated Soil	ND, DL = 0.1	---	Low	High
TPH	Contaminated Soil	ND, DL = 0.01b	---	Low	High

- a. ND = not detected
DL = detection limit in ppm
b. Units = mg/g

B/

QUALITATIVE RISK AND RELIABILITY EVALUATION TABLE			
	QUALITATIVE RISK		
	LOW	MEDIUM	HIGH
HIGHLY UN-RELIABLE	<div>screening data</div> <div>TRACK II</div> <div>screening data</div>		
HIGHLY RELIABLE	NO ACTION REQUIRED	RI/FS	INTERIM ACTION*
reliability	LOW concentration resulting in risk < 10^{-6}	MEDIUM	HIGH concentration resulting in risk > 10^{-6}
	qualitative risk		

* if there exist sufficient data to identify an appropriate remedy

Question 1. What are the waste generation process locations and dates of operation associated with this site?

Block 1 Answer:

COCA Site CFA-33 is the location of a removed underground storage tank designated CFA-667S. The capacity of the tank was initially believed to be 6,000 gal, but upon removal, the dimensions of the tank were used to calculate an actual capacity of 4,000 gal. The steel tank was installed in 1951 at the southwest corner of building CFA-667 and used for storing fuel oil for heating the building. A map of the tank location is attached. The tank was operational until 1986, when it was abandoned. Records indicate that the tank had no internal protection and that the outside of the tank was painted for external protection. The associated piping was constructed of tar-coated steel. The area around the buried tank was enclosed by a fence, and consequently, a secondary access to the fill pipe was run from the tank to outside the fence, approximately 12 ft from the tank. A vent pipe was also present with this tank, located approximately 5 ft from the tank next to CFA-667. A ground penetrating radar (GPR) survey was employed by the Tank Management Program which provided this information; a diagram of the GPR results is attached.

Block 2 How reliable is/are the information source/s? XHigh Med Low (check one)

EXPLAIN THE REASONING BEHIND THIS EVALUATION.

The information was obtained from personnel involved directly in the processes associated with operation of the tank, content sampling, and tank removal.

Block 3 Has this INFORMATION been confirmed? XYes No (check one)
IF SO, DESCRIBE THE CONFIRMATION.

The location, size, and logistics of the tank were verified upon removal in October 1990.

Block 4 Sources of Information: (check appropriate box(es) and write in source)

No available information	<input type="checkbox"/>	Analytical data	<input checked="" type="checkbox"/> 4
Anecdotal	<input checked="" type="checkbox"/> 8	Documentation about data	<input type="checkbox"/>
Historical process data	<input type="checkbox"/>	Disposal data	<input type="checkbox"/>
Current process data	<input type="checkbox"/>	Q.A. data	<input type="checkbox"/>
Aerial photographs	<input type="checkbox"/>	Safety analysis report	<input type="checkbox"/>
Engineering/site drawings	<input type="checkbox"/>	D&D report	<input type="checkbox"/>
Unusual Occurrence Report	<input type="checkbox"/>	Initial assessment	<input type="checkbox"/>
Summary documents	<input checked="" type="checkbox"/> 10	Well data	<input type="checkbox"/>
Facility SOPs	<input type="checkbox"/>	Construction data	<input type="checkbox"/>
OTHER	<input checked="" type="checkbox"/> 6, 12		

Question 2. What are the disposal process locations and dates of operation associated with this site? How was the waste disposed?

Block 1 Answer:

In May 1989, the tank contents were sampled by EG&G Idaho Environmental Science and Technology (ES&T) personnel for waste profile analysis. The sample was sent to EG&G Idaho Environmental Chemistry for laboratory analysis and determined to be #2 diesel fuel. The level of liquid in the tank was measured by ES&T personnel and found to be approximately 1.5 in. In October 1990, prior to removal of the tank, 20 gal of liquid were pumped from the tank by EG&G Idaho Hazardous Waste Programs for recycling. Less than 0.5 in. of liquid was left in the tank.

Removal of the tank occurred on October 24, 1990 under the guidance of EG&G Idaho Tank Management Program removal procedures. Volatile organic compound (VOC) readings were taken by ES&T personnel using a Photovac Microtip photionization detector (PID) throughout the removal process. All readings were found to be well below the EG&G Idaho field action levels for diesel of 50 ppm. According to sampling records, a small diesel-contaminated region of soil was observed near the fill port but was removed and transported to the INEL landfill for landfarming. Five soil samples were collected from the excavation by ES&T personnel for laboratory analysis. Samples were taken specifically from areas where contamination from the tank contents was most likely to occur. The soil sampling areas are shown on the attached diagram. Samples were collected by scooping the tank excavation with a heavy equipment bucket and sampling directly from this removed soil. The scoop samples were taken from a uniform depth of 7 ft. The samples were screened with the PID for preliminary VOC readings and found to be well below the EG&G field action levels for diesel. Based on the condition of the tank and the field VOC readings, the excavation was deemed acceptable for backfilling and was done with noncontaminated soil from the excavation and with soil from the gravel pit at the INEL CFA.

Laboratory analyses of the soil sampled were performed by DataChem Laboratories of Salt Lake City, UT for total petroleum hydrocarbons (TPH) and for benzene, toluene, ethylbenzene, and xylene (collectively known as BTEX). No contamination was found in any of the samples. Laboratory detection limits were given as 0.05 ug/g for benzene, toluene, and ethylbenzene; 0.1 ug/g for xylene; and 0.01 mg/g for TPH.

The tank was cut into smaller pieces and shipped to Pacific Steel of Idaho Falls for disposal. Four pieces of piping were included in the shipment.

Block 2 How reliable is/are the information source/s? ☒ High ☐ Med ☐ Low (check one)

EXPLAIN THE REASONING BEHIND THIS EVALUATION.

The information was obtained from sampling logbooks and removal records documenting the sampling and removal process.

Question 2. What are the disposal process locations and dates of operation associated with this site? How was the waste disposed?
(Continued)

Block 3 Has this INFORMATION been confirmed? X Yes No (check one)

IF SO, DESCRIBE THE CONFIRMATION.

Several sources were used to obtain this information.

Block 4 **Sources of Information:** (check appropriate box(es) and write in source)

No available information	<input type="checkbox"/>	Analytical data	<input checked="" type="checkbox"/>	3
Anecdotal	<input type="checkbox"/>	Documentation about data	<input type="checkbox"/>	
Historical process data	<input type="checkbox"/>	Disposal data	<input checked="" type="checkbox"/>	7,11
Current process data	<input type="checkbox"/>	Q.A. data	<input type="checkbox"/>	
Areal photographs	<input checked="" type="checkbox"/>	Safety analysis report	<input type="checkbox"/>	
Engineering/site drawings	<input type="checkbox"/>	D&D report	<input type="checkbox"/>	
Unusual Occurrence Report	<input type="checkbox"/>	Initial assessment	<input type="checkbox"/>	
Summary documents	<input checked="" type="checkbox"/>	Well data	<input type="checkbox"/>	
Facility SOPs	<input type="checkbox"/>	Construction data	<input type="checkbox"/>	
OTHER	<input checked="" type="checkbox"/>			2

Question 3. Is there empirical, circumstantial, or other evidence of migration?
If so, what is it?

Block 1 Answer:

No evidence exists of migration.

Block 2 How reliable is/are the information source/s? XHigh Med Low (check one)

EXPLAIN THE REASONING BEHIND THIS EVALUATION.

The information was obtained from personnel directly involved in the removal process.

Block 3 Has this INFORMATION been confirmed? XYes No (check one)

IF SO, DESCRIBE THE CONFIRMATION.

The use of more than one source provides verification of this information.

Block 4 Sources of Information: (check appropriate box(es) and write in source)

No available information	<input type="checkbox"/>	Analytical data	<input checked="" type="checkbox"/>	3
Anecdotal	<input checked="" type="checkbox"/>	Documentation about data	<input type="checkbox"/>	
Historical process data	<input type="checkbox"/>	Disposal data	<input type="checkbox"/>	
Current process data	<input type="checkbox"/>	Q.A. data	<input type="checkbox"/>	
Areal photographs	<input checked="" type="checkbox"/>	Safety analysis report	<input type="checkbox"/>	
Engineering/site drawings	<input type="checkbox"/>	D&D report	<input type="checkbox"/>	
Unusual Occurrence Report	<input type="checkbox"/>	Initial assessment	<input type="checkbox"/>	
Summary documents	<input checked="" type="checkbox"/>	Well data	<input type="checkbox"/>	
Facility SOPs	<input type="checkbox"/>	Construction data	<input type="checkbox"/>	
OTHER	<input checked="" type="checkbox"/>	2, 12		

Question 4. Is there evidence that a source exists at this site? If so, list the sources and describe the evidence.

Block 1 Answer:

No evidence exists indicating that a source exists at this site. Any possible source was removed from the excavation and subsequent soil sample analyses indicated no contamination. The excavation was backfilled to grade with original noncontaminated soil and soil from the INEL CFA gravel pit.

Block 2 How reliable is/are the information source/s? XHigh Med Low (check one)

EXPLAIN THE REASONING BEHIND THIS EVALUATION.

The information was obtained directly from records documenting the removal process.

Block 3 Has this INFORMATION been confirmed? XYes No (check one)

IF SO, DESCRIBE THE CONFIRMATION.

Field VOC readings are consistent with data obtained from the analytical laboratory, substantiating this information.

Block 4 Sources of Information: (check appropriate box(es) and write in source)

No available information	<input type="checkbox"/>	Analytical data	<input checked="" type="checkbox"/> 3
Anecdotal	<input type="checkbox"/>	Documentation about data	<input type="checkbox"/>
Historical process data	<input type="checkbox"/>	Disposal data	<input type="checkbox"/>
Current process data	<input type="checkbox"/>	Q.A. data	<input type="checkbox"/>
Areal photographs	<input type="checkbox"/>	Safety analysis report	<input type="checkbox"/>
Engineering/site drawings	<input type="checkbox"/>	D&D report	<input type="checkbox"/>
Unusual Occurrence Report	<input type="checkbox"/>	Initial assessment	<input type="checkbox"/>
Summary documents	<input checked="" type="checkbox"/> 10	Well data	<input type="checkbox"/>
Facility SOPs	<input type="checkbox"/>	Construction data	<input type="checkbox"/>
OTHER	<input checked="" type="checkbox"/> 2		

Question 5. Does the site operating or disposal historical information allow estimation of the pattern of potential contamination? If the pattern is expected to be a scattering of hot spots, what is the expected minimum size of a significant hot spot?

Block 1 Answer:

The pattern of potential contamination is determined to be a hot spot around a leak in the tank or fill pipes.

Block 2 How reliable is/are the information source/s? X High Med Low (check one)

EXPLAIN THE REASONING BEHIND THIS EVALUATION.

This information is based on past experience with leaking tanks.

Block 3 Has this INFORMATION been confirmed? X Yes No (check one)
IF SO, DESCRIBE THE CONFIRMATION.

Consultations with individuals knowledgeable about tanks and tank leakage.

Block 4 Sources of Information: (check appropriate box(es) and write in source)

No available information	<input type="checkbox"/>	Analytical data	<input type="checkbox"/>
Anecdotal	<input checked="" type="checkbox"/> 8	Documentation about data	<input type="checkbox"/>
Historical process data	<input type="checkbox"/>	Disposal data	<input type="checkbox"/>
Current process data	<input type="checkbox"/>	Q.A. data	<input type="checkbox"/>
Aerial photographs	<input type="checkbox"/>	Safety analysis report	<input type="checkbox"/>
Engineering/site drawings	<input type="checkbox"/>	D&D report	<input type="checkbox"/>
Unusual Occurrence Report	<input type="checkbox"/>	Initial assessment	<input type="checkbox"/>
Summary documents	<input type="checkbox"/>	Well data	<input type="checkbox"/>
Facility SOPs	<input type="checkbox"/>	Construction data	<input type="checkbox"/>
OTHER	<input type="checkbox"/>		

Question 6. Estimate the length, width, and depth of the contaminated region. What is the known or estimated volume of the source? If this is an estimated volume, explain carefully how the estimate was derived.

Block 1 Answer:

Based on analytical data, no contaminated region exists. However, using the dimensions of 14 ft long, 6 ft wide/deep obtained by the GPR survey, and the known capacity of the tank, 4,000 gal, a hypothetical contaminated region could be estimated. Using a model developed by EG&G Idaho, Inc., a region of 350 yd³ of soil is estimated. The model and calculations are attached.

Block 2 How reliable is/are the information source/s? X High Med Low
(check one)

EXPLAIN THE REASONING BEHIND THIS EVALUATION.

The information was obtained from records documenting the field sampling process and from an established analytical laboratory.

Block 3 Has this INFORMATION been confirmed? X Yes No (check one)

IF SO, DESCRIBE THE CONFIRMATION.

Field analyses of the soil samples were confirmed by the laboratory analytical data which supports the conclusion that a contaminated region does not exist.

Block 4 Sources of Information: (check appropriate box(es) and write in source)

No available information	<input type="checkbox"/>	Analytical data	<input checked="" type="checkbox"/> 3
Anecdotal	<input type="checkbox"/>	Documentation about data	<input type="checkbox"/>
Historical process data	<input type="checkbox"/>	Disposal data	<input type="checkbox"/>
Current process data	<input type="checkbox"/>	Q.A. data	<input type="checkbox"/>
Aerial photographs	<input type="checkbox"/>	Safety analysis report	<input type="checkbox"/>
Engineering/site drawings	<input type="checkbox"/>	D&D report	<input type="checkbox"/>
Unusual Occurrence Report	<input type="checkbox"/>	Initial assessment	<input type="checkbox"/>
Summary documents	<input type="checkbox"/>	Well data	<input type="checkbox"/>
Facility SOPs	<input type="checkbox"/>	Construction data	<input type="checkbox"/>
OTHER	<input checked="" type="checkbox"/> 2, 6		

Question 7. What is the known or estimated quantity of hazardous substance/constituent at this source? If the quantity is an estimate, explain carefully how the estimate was derived.

Block 1 Answer:

Based on analytical results of soil samples taken from the excavation, it is determined that no hazardous substance is present as no source is present.

Block 2 How reliable is/are the information source/s? X High Med Low (check one)

EXPLAIN THE REASONING BEHIND THIS EVALUATION.

The information was obtained from records documenting the removal process and from results from an established analytical laboratory.

Block 3 Has this INFORMATION been confirmed? X Yes No (check one)

IF SO, DESCRIBE THE CONFIRMATION.

Field results of the soil samples coincide with results from the analytical laboratory.

Block 4 Sources of Information: (check appropriate box(es) and write in source)

No available information	<input type="checkbox"/>	Analytical data	<input checked="" type="checkbox"/>	3
Anecdotal	<input type="checkbox"/>	Documentation about data	<input type="checkbox"/>	
Historical process data	<input type="checkbox"/>	Disposal data	<input type="checkbox"/>	
Current process data	<input type="checkbox"/>	Q.A. data	<input type="checkbox"/>	
Aerial photographs	<input type="checkbox"/>	Safety analysis report	<input type="checkbox"/>	
Engineering/site drawings	<input type="checkbox"/>	D&D report	<input type="checkbox"/>	
Unusual Occurrence Report	<input type="checkbox"/>	Initial assessment	<input type="checkbox"/>	
Summary documents	<input type="checkbox"/>	Well data	<input type="checkbox"/>	
Facility SOPs	<input type="checkbox"/>	Construction data	<input type="checkbox"/>	
OTHER	<input checked="" type="checkbox"/>	2		

Question 8. Is there evidence that this hazardous substance/constituent is present at the source as it exists today? If so, describe the evidence.

Block 1 Answer:

No evidence exists indicating a source exists at this site. The tank was removed, soil samples taken from the excavation were determined noncontaminated, and the excavation was backfilled to grade with noncontaminated soil.

Block 2 How reliable is/are the information source/s? XHigh Med Low (check one)

EXPLAIN THE REASONING BEHIND THIS EVALUATION.

The information is based on record documenting the removal process and results from an established analytical laboratory.

Block 3 Has this INFORMATION been confirmed? XYes No (check one)
IF SO, DESCRIBE THE CONFIRMATION.

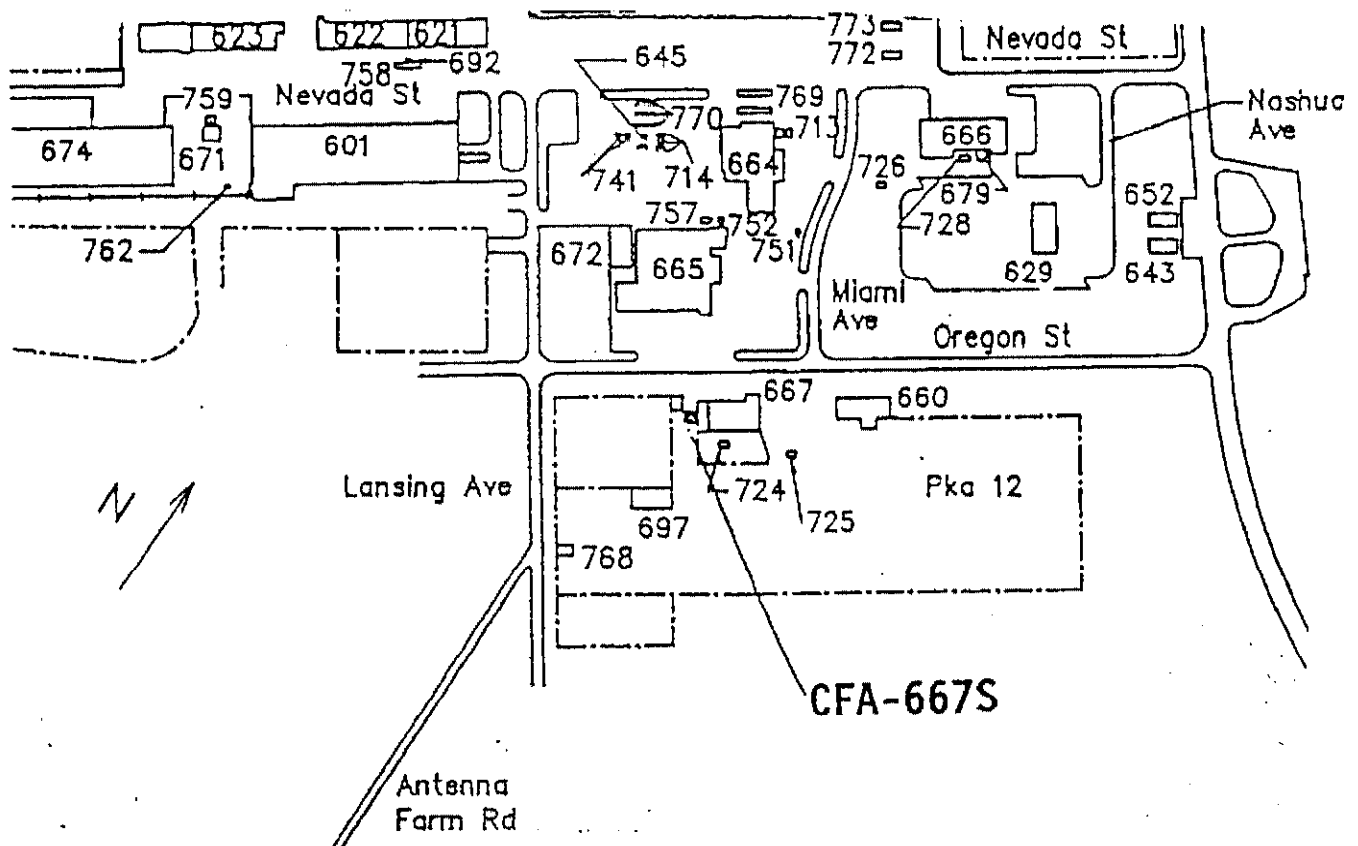
Field sampling results coincide with laboratory analytical results.

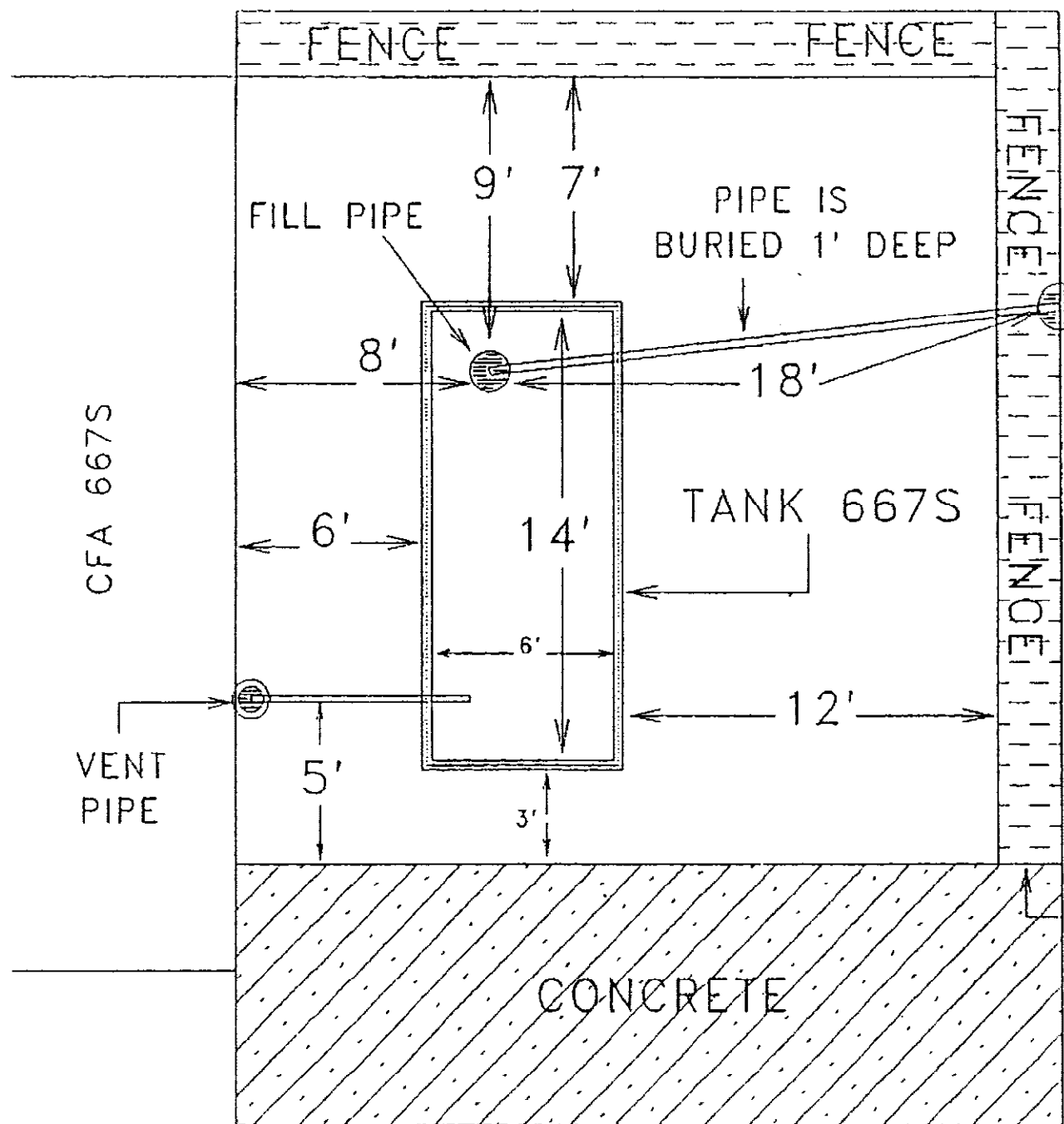
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Current process data	<input type="checkbox"/>	Q.A. data	<input type="checkbox"/>	
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OTHER	<input checked="" type="checkbox"/>	2		

REFERENCES

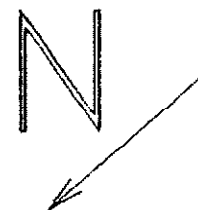
1. CFA-33 Summary Assessment, EG&G Idaho, Inc., dated March 22, 1991.
2. Daniel, V. E., EG&G Idaho, Inc. Environmental Technology Sampling Logbook, pp. 31-32, 34-36.
3. Datachem Laboratories, Analytical Report, dated November 15-16, 1990.
4. EG&G Idaho, Inc. Environmental Chemistry Analytical Report, ROA # 144, dated August 7, 1989.
5. EG&G Idaho, Inc. photographs.
6. Hanson, L., T. Brunson, P. Evans, Ground Penetrating Radar for CFA-667, Tape ID 0011, EG&G Idaho, Inc., INEL Underground Storage Tank Location Project, dated September 19, 1990.
7. Hazardous Waste Programs Form EG&G 464, EG&G Idaho, Inc., dated October 9, 1990
8. Hood, D. N., personal communication, November 14, 1991.
9. Hood, D. N., personal communication, December 9, 1991.
10. Ludi, K. M., Tank Removal Summary for CFA-667S, February 26, 1991.
11. Tank Disposition Form, Tank CFA-667-S, EG&G Idaho, Inc., dated November 27, 1990.
12. Permann, P. J., EG&G Idaho, Inc. Environmental Science and Technology Sampling Logbook, pp. 0028, 0030-0031.
13. Ludi, K. M., Sampling and Analysis Plan for Site Assessment During the Closure or Replacement of NonRadioactive Underground Storage Tanks, EGG-WM-9554, April 1991.





NOTE! TANK
IS 3' DEEP
AND 6000 GAL.

SECONDARY
ACCESS

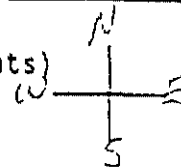


GATE

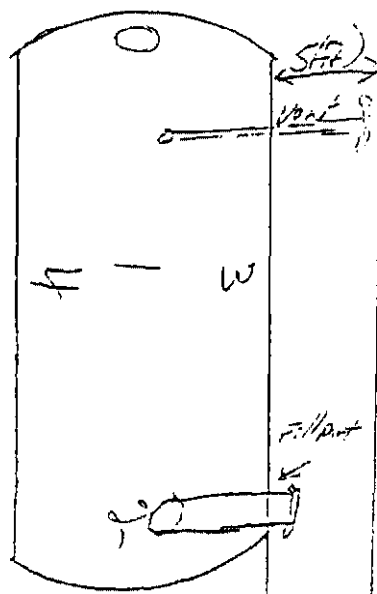
DC TK667S

SAMPLE LOGBOOK

MAP OF SAMPLING LOCATION:
 (include location of sampling points and reference points)
CEA 667S Fuel oil (6000 gallons)



OREGON ST.



LF667

RECORDED BY:

Vinco Daniel

QA CHECK BY:

K M Lue

ESTIMATION OF VOLUME OF CONTAMINATED SOIL
FROM A FUEL OIL SPILL

A. S. ROOD

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PROBLEM: What is the volume of contaminated soil which would result from a surface fuel oil spill of a known or estimated quantity?

ASSUMPTIONS:

- N GALLON FUEL SPILL
- SOIL POROSITY = 0.35 (ρ) (Case et al., pg A-62)
- THE RESIDUAL SATURATION CAPACITY (RS) = { 0.10, 0.15, 0.20 }

The residual saturation for fuel oils is approximately 33% of the water holding capacity of the soil. Dragun (1988) reports maximum RS values for different fuel oils.

Table 1. Residual Saturation (RS) values for different fuels.

Fuel	RS
light oil and gasoline	0.10
diesel and light fuel oil	0.15
lube and heavy fuel oil	0.20

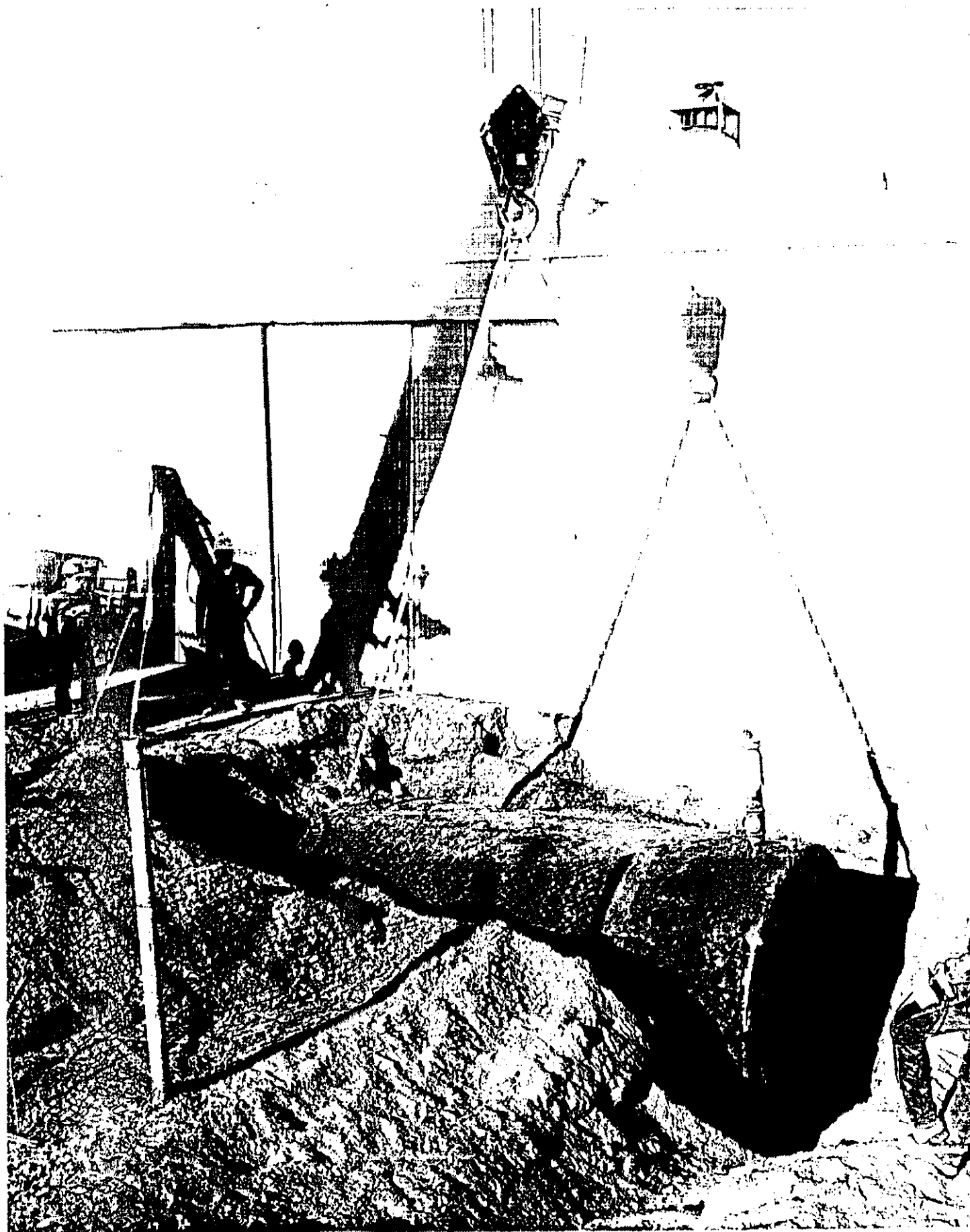
The volume of soil in cubic yards contaminated by a spill is given by (Dragun, 1988)

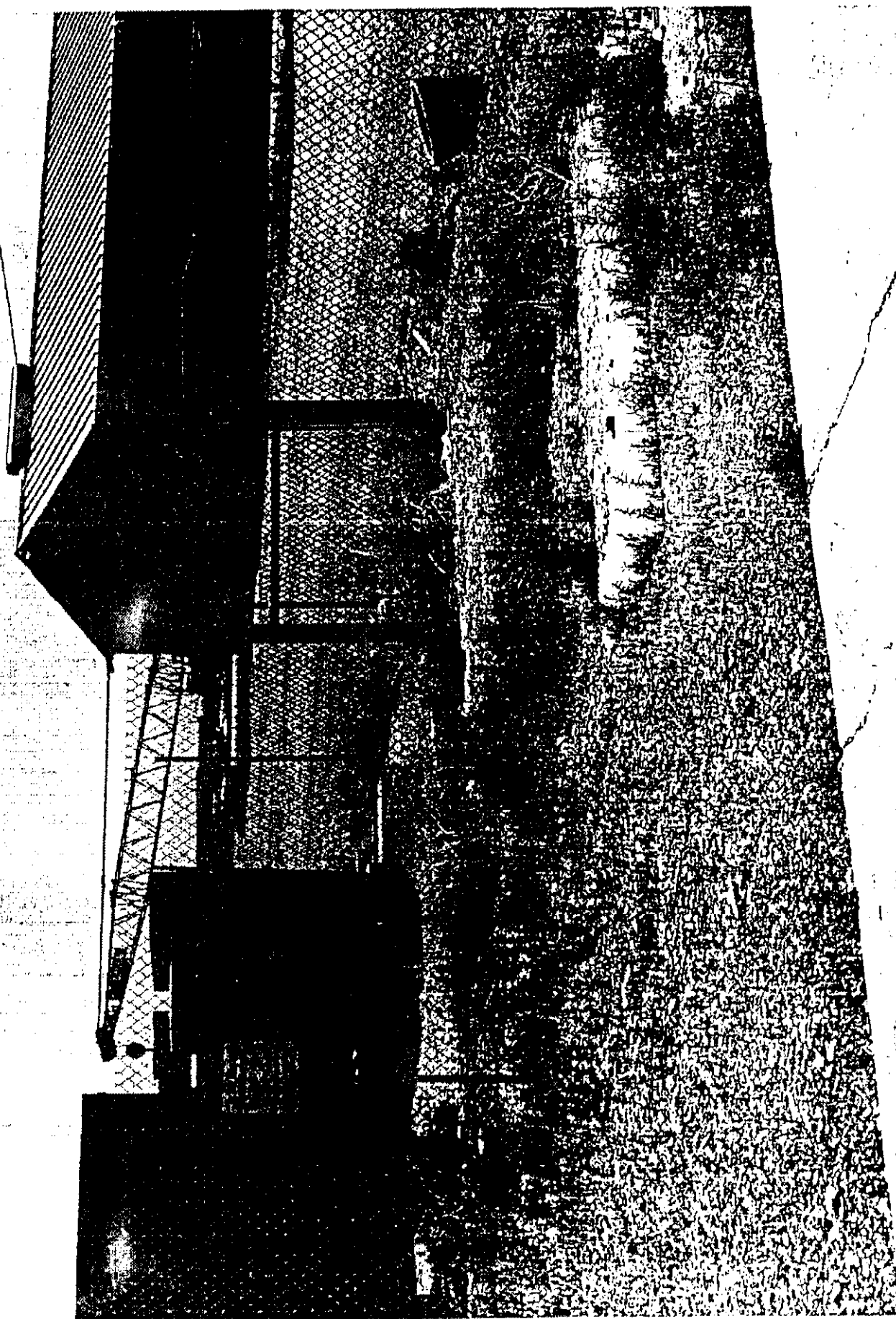
$$V_s = \frac{0.2 \times V_{zc}}{\rho \times (RS)} \quad (1)$$

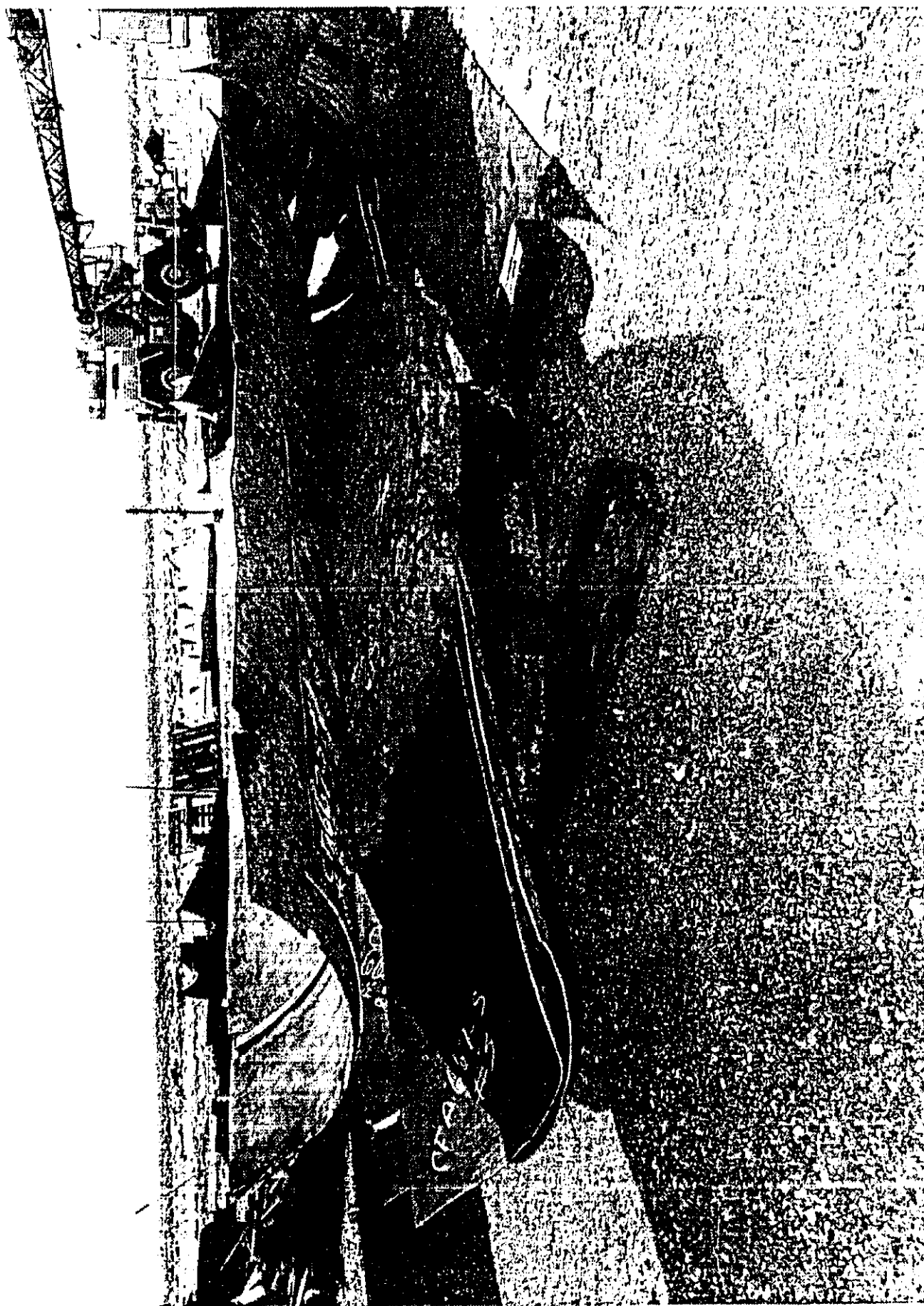
where V_s = Volume of contaminated soil at residual saturation (yd^3).

V_{zc} = volume of discharged hydrocarbons in barrels

= (N gallons of spilled fuel) x (1 barrel per 42 gallons)







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